



# Participation of Emerging Space Countries (PECS) -Roadmaps Reviews- Meetings Report January 2021

## 1. Background:

This report summarizes the Roadmap reviews meetings that were conducted with teams participating in the PESC project. The PESC project aims to involve emerging space countries in the Moon Village concept.

In summer 2020, the MVA called for teams from emerging space countries around the world to participate in an activity to draft a roadmap for their country to participate in the Moon Village concept. By the end of 2020, 9 countries submitted roadmaps. The activity of drafting the roadmap can be seen as a capacity building activity because it was mentored by experts from the MVA. The delivery of the Roadmaps completed the phase 1 of the PECS project

In order to provide feedback to the countries that have submitted roadmaps, a series of 9 review meetings were conducted in January 2021 as follow:

Date		Slot 1 (17:00 - 18:00) CET	Slot 2 (18:30 – 19:30) CET
4-Jan	Monday		
6-Jan	Wednesday	Colombia	
8-Jan	Friday	Mexico	Egypt
11-Jan	Monday	Nepal	Kenya
13-Jan	Wednesday	Chile	Jordan
15-Jan	Friday	Mongolia	Kuwait

This report summarizes major outcomes and important issues discussed during the meetings with each country, and a synthesis matrix was generated. For each feedback meeting, a report which explains in more details the meetings were created for each country and the reports are all attached in this document.



Each meeting consisted of about 25 minutes roadmap presentation by the team’s members, about 20 minutes discussion with the MVA president and vice president, and 10 minutes for the Way Forward. The roadmaps way forward discussed involved two approaches: the Top/Down (activities initiated by the team), and Bottom/Up (activities initiated by space agencies/governments). During the meetings, both approaches were discussed, and all information are documented in the report, all meetings were recorded.

## 2. Synthesis matrix:

Four matrices were generated for each region (Middle East, Africa, Latin America and Asia Pacific).

### Middle East:

	<b>Kuwait</b>	<b>Egypt</b>	<b>Jordan</b>
<b>PESC Team</b>	4 members Independent Group	11 Members from different background	4 Members independent Group
<b>Space Agency Connection</b>	No space agency and not a member in COPUOS	Well Connected to space agency	No Space agency
<b>Country's Capability and potential for the Moon</b>	A detailed survey will be conducted	Earth Observation	The desert in Jordan can host an analogue facility
<b>MVA Local Network</b>	Network Established	Network Established	Network not yet established
<b>Past Actions</b>	Outreach activities started working on research projects	Meetings with Space agency	Investor identified for the Analogue facility
<b>Proposed Bottom/Up Activities</b>	Outreach about cultural considerations  conducting a survey to about labs equipment and sectors	Literature Research to identify the payload of the 12 U moon orbiter	Set up analogue facility in Wadi Rum desert as goal to foster capacity building  Proof of concept



	<p>3 research projects are Thermal management for solar cells and electronics in the moon, Astrophysics in the moon and medical research in the moon.</p>		<p>outreach activities and branding</p>
<p><b>Observations</b></p>	<p>Expand the team in Kuwait.          identify connections in the PESC project for partnerships.          link individual projects with country's interests.            More specific goals to measure future progress</p>	<p>Participate in MVA WGs.          More specific Goals to measure future progress</p>	<p>Set up Network          Participate in MVA WGs.          Specific Goals to measure future progress.          Contact the UN Regional Space Center          Use MVA social media platforms for outreach in Jordan.</p>
<p><b>Top/Down Actions</b></p>	<p>Forster Government Involvement (Participation in COPUOS). Foster involvement of UN Regional Center for Science and Technology</p>	<p>Forster African cooperation in Lunar CubeSat Mission          Define a longer term strategy after the 12 U CubeSat launch</p>	<p>Foster Government Involvement</p>



Africa:

	<b>Kenya</b>
<b>PESC Team</b>	19 Members from different background
<b>Space Agency Connection</b>	Well connected to Space Agency
<b>Country's Capability and potential for the Moon</b>	Agriculture & Biosystems Launch capabilities Astronomy Communications and Networks Nuclear Power Sources Sciences Missions Robotics
<b>MVA Local Network</b>	Not Yet Established
<b>Past Actions</b>	Communications with the Space Agency
<b>Proposed Bottom/Up Activities</b>	projects feasibility studies  Communications with Universities and other stockholders  Prioritize the projects and focus only on some projects
<b>Observations</b>	Many projects were mentioned and the team should prioritize  New Thermal Management should be used for RTGs operating in the moon  simulate Lunar Regolith for Agriculture  Considering the idea of All-Electrical mining equipment



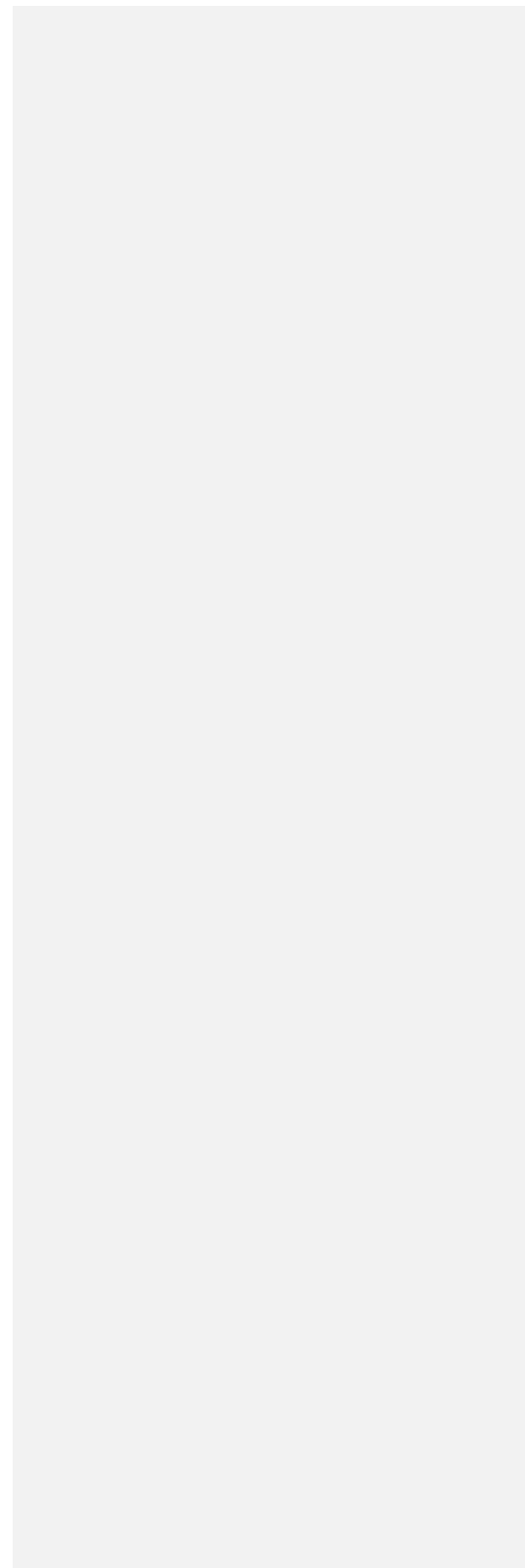
<b>Top/Down Actions</b>	Foster African involvement
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Asia Pacific:

	Mongolia	Nepal
PESC Team	9 team members, many of them working in space - related institutes	8 members who belong to a space NGO led by the youth
Space Agency Connection	No space agency, but well connected to the National Space council and other space- related institutes	No space agency
Country's Capability and potential for the Moon	Geographical and environmental factors makes the Gobi desert ideal for moon analogue facility  Vision 2050 support some space activities including space start-ups and analogue facility	The Geography of the Himalaya  Tourism Industry
MVA Local Network	Not Yet established	Newly established among a group of youth

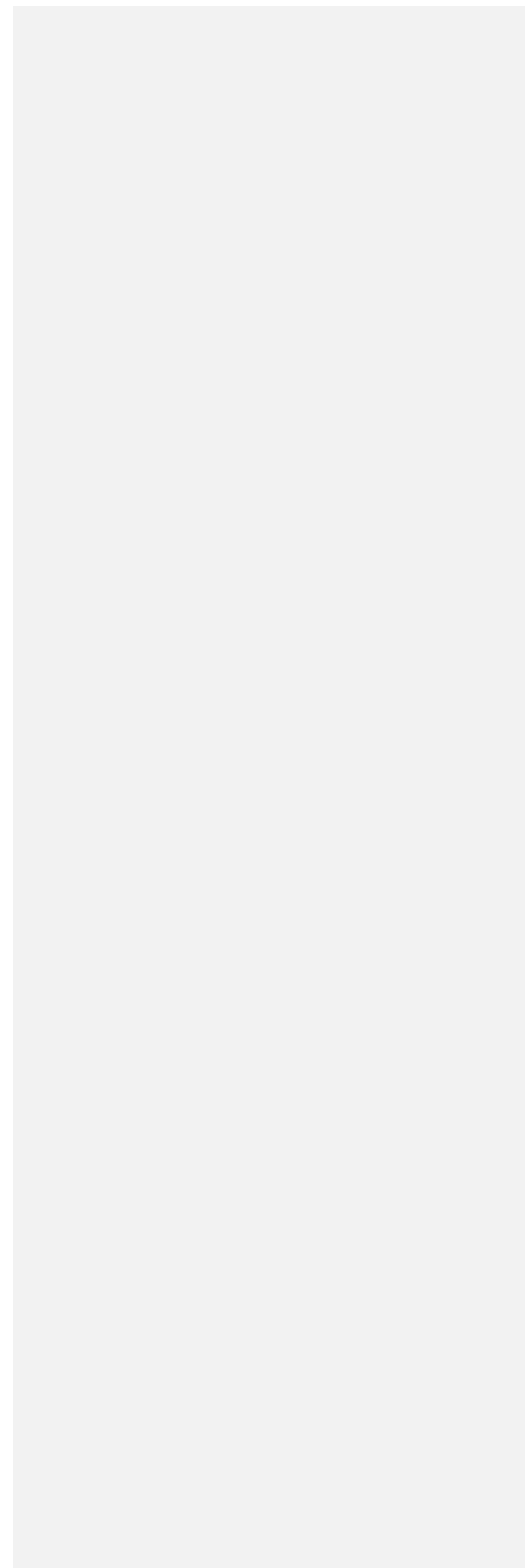


<p>Past Actions</p>		<p>Calls with existing analogue facilities directors around the world.</p>
<p>Proposed Bottom/Up Activities</p>	<p>Draft rules and guidelines for Lunar Rover competition</p> <p>Analogue facility</p> <p>Perform a survey to understand the needs of potential stockholders (including international partners in Asia)</p>	<p>High altitude observatory</p> <p>Analogue facility</p> <p>Space themed hotel for tourism</p> <p>Conducting feasibility study for the above projects</p>
<p>Observations</p>	<p>A suggestion to consider the south pole for the analogue facility and convince a major player to co-sponsor.</p> <p>To integrate moon plans with education in Mongolia will attract more stockholders</p>	<p>R&amp;D should be considered for the analogue facility</p> <p>The Himalaya geography and geology</p>





	<p>To expand Mongolia's experience in LOE to the moon</p> <p>ISRO can be a potential stockholder especially that the MVA has an agreement with ISRO for outreach. Mongolia PESC team can benefit from that.</p> <p>Involving Mongolia PESC team in MVA WGs</p> <p>Specific action plan to measure future progress</p>	<p>MVA can support by finding partners</p> <p>Activate MVA local network more</p> <p>Space can motivate STEM education</p> <p>More specific action plan to measure future progress</p>
<p>Top/Down Actions</p>	<p>Fostering government to involve in moon activities</p>	<p>Support the involvement of Nepal to join COPUOS and outreach for CHANDRAAN-3</p>





Latin America:

	<b>Chile</b>	<b>Colombia</b>	<b>Mexico</b>
<b>PESC Team</b>	7 members from different ages and backgrounds, and different space related institutes in Chile	8 independent members from different background	3 independent members
<b>Space Agency Connection</b>	No space agency, but only Chilean Space Association	No space agency in Colombia	Good connection with space agency
<b>Country's Capability and potential for the Moon</b>	<p>Analogue sites due to the Geography of Chile</p> <p>Astronomy</p> <p>Energy</p> <p>Science</p> <p>Industry</p>	<p>15 different fields were identified in the Roadmap, but the team will work to group up the fields into only 6 strategic fields</p>	<p>Current space activities are related to remote sensing and communications</p> <p>Interest about space exploration was since the 60s, but was needed due to political reasons in the 70s</p> <p>Recently, there is an increased interest about the moon by the space agency</p> <p>Identified strong fields are: robotics, data management, communications and other industries</p>
<b>MVA Local Network</b>	Not yet established	Not yet established	Not yet established
<b>Past Actions</b>			Previous work was done about the robotic project





<p><b>Proposed Bottom/Up Activities</b></p>	<p>Telescope in the Moon</p> <p>Light Vehicles in the Moon</p> <p>Technology in crops production in high altitude</p> <p>Space architecture projects</p> <p>Tunnels design and underground mining</p> <p>Clothes in the moon by the production of fabrics</p>	<p>Identify strategic fields for Colombia with relation to the moon</p> <p>The creation of educational ecosystem related to moon sciences and its applications</p> <p>Analogue facility that support education in Colombia</p> <p>Space policy research and related administrative issues</p> <p>Agriculture and food growing</p> <p>The Use of 30 m antenna to support a deep space network</p>	<p>Project: Development of Multi-Use robots infrastructure in the moon</p> <p>Project: Experimentation of manufacturing methods in microgravity using terrestrial and lunar materials</p> <p>Project: Resilient communications on the Moon surface for robotic-human operations</p> <p>To convert the above three projects to the national level</p>
<p><b>Observations</b></p>	<p>Investigate about common factors between mining and astronomy in extreme environment</p> <p>Investigate a viable solution in high altitude agriculture</p>	<p>Being involved in MVA WGs is important for Colombia team</p> <p>The creation of a local MVA team.</p>	<p>A traceability matrix is an important tool to link between the mentioned three projects</p> <p>There is an opportunity for cooperation between Mexico Team and MVA institutional members.</p>



	<p>Identify Solutions for local mining industry by adapting All-Electrical equipment that can be used in the moon</p> <p>Identify what will make an analogue facility unique in Chile</p> <p>More specific objectives to measure future progress</p> <p>Participation in MVA WGs</p> <p>Create a MVA local network</p> <p>Prioritize the projects</p> <p>Consider outreach and education</p>	<p>The industry might be interested on the moon market</p> <p>Join Education and outreach Moon Market</p> <p>More specific goals to measure future progress</p>	<p>It is possible to create a communication sub-group within the Architecture WG</p> <p>Creation of a local MVA network</p> <p>Specific goals to measure future progress</p> <p>Mexico can join forces with other governments to request from the ITU commercial radio frequencies. Education and outreach are important but missing from the roadmap.</p> <p>Connect with the UN Space Sciences institute</p>
<b>Top/Down Actions</b>	<p>Communicate with the government with regards to GEGSLA</p> <p>Foster involvement of UN Regional Center for Science and Technology</p>	<p>Foster the involvement of the government for moon activities</p>	<p>Foster government involvement in moon activities.</p>



# Columbia Feedback Meeting Report:

6 January 2021

## Participants:

From Colombia PESC team, Oscar Ojeda, Alejandro Crozo and Camilo Zorro

The president and vice president of the MVA participated in the meeting as well as the MV-PESC project manager and MV-PESC Latin America Regional coordinator.

## Background

This report summarizes the discussion happened during the Feedback meeting with Colombia team. The MV-PESC project main deliverable is a roadmap for an emerging space country to participate in the Moon Village. As the participating teams drafted a roadmap, the goal of this meeting is to provide feedback with additional mentorship. The roadmap submitted by the team, October, was discussed and possible future activities were recommended.

## Meeting Highlights:

Columbia team presented the challenges that are facing Columbia and in general developing countries for involving themselves in moon village activities, this is summarized as follow:

- a. Given major problems the Columbia as a developing country is facing (poverty, unemployment, etc..) how it is possible to convince the government and the public to involve the country in moon activities?
- b. No aerospace ecosystem in Columbia
- c. Space exploration project (including moon activities) has no market yet. This prevents further development of such projects. Other obstacles also include the ITAR.
- d. Development of Human Resources. Colombians face difficulties to develop in the field of Moon activities. An example is to obtain internships and involvement in real projects.
- e. The Columbia PESC Team share the same prospective and enthusiasm about the moon (they know each other previously). It is important to Listen to other people with different perspectives.

Colombia team suggested a strategy to overcome the above challenges as follow:

- a. First thing is to invest on education like internships. Education is the most important tool and moon activities in Colombia should start with education.
- b. Increase space analogues research can provide better educational opportunities.

In order to implement the strategy, Colombia team suggested the following:



- 1- Organize webinars about the moon related topics.
- 2- Involvement of Colombian PESC teams in MVA working groups

### Roadmap:

The roadmap was written to comply with the government strategy. 15 different fields were identified in the roadmap that are related to moon activities. The PESC team will group these activities in strategic areas, max 6.

The MVA president emphasized on the importance of identifying the current capabilities.

The vice president suggested the involvement of the PESC Colombia team members to perform some tasks and activities for the MVA working group. The team believed that this is a desirable step.

### Way forward:

Future actions should take into account the following approaches

#### Bottom – Up

- 1- Creation of MVA network in Columbia to have a permanent platform in the country. This should be coupled with creation of relevant social media in the local language
- 2- Engage Colombian people in the Education and Outreach Working Group. Oscar suggests that the team wants to make an outreach plan for their roadmap using graphic designer.
- 3- The President suggested that industry might be interested in the moon market. Possible actions are to contact industry and Identify existing industrial capacity that could be useful for the moon.

#### Top – Down:

The government of Colombia is being exposed to several different issues on space policy; i.e.: Colombia has recently ratified the OST; Vienna Delegation has received a letter inviting them to participate in an Global Expert Group on Sustainable Lunar Activities (GEGSLA) created by the MVA. It is suggested:

- 1- PESC team, with MVA support, could foster clarification and involvement of the government in this WG as well confirm the validity of the projects proposed in this roadmap
- 2- MVA could help in fostering contacts with other organizations outside Colombia



### Conclusion:

The Roadmap will be revised taking into account this report and MVA will review the status of implementation in 6 or 12 months. Ghanim will be involved regularly in supporting the PECS team and arranging specific MVA support



# Egypt Roadmap Feedback Meeting

8 January 2020

## Participants:

From Egypt PESC Team:

- 1- Moataz AbdelAzim,
- 2- Ahmed Farid,
- 3- AbuBakr Ramadan,
- 4- Marwa Khaled,
- 5- Hoda Awny,
- 6- Rahma Ali,
- 7- Mahmoud Amr Abdel Monem,
- 8- Maryam Haytham Esmat

From the Moon village association, The President, Vice President, PESC Project manager and PESC Middle East Regional Coordinator attended the meeting.

## Background:

This report summarizes the discussion happened during the Feedback meeting with Egypt team. The MV-PESC project main deliverable is a roadmap for an emerging space country to participate in the Moon Village. As the participating teams drafted a roadmap, the goal of this meeting is to provide feedback with additional mentorship. The roadmap submitted by the team, October, was discussed and possible future activities were recommended.

## Presentation Summary:

The Egyptian team revealed that they have met with Egypt Space Agency and the Agency showed great interest and they are considering to fund a 12 U CubeSat as a moon orbiter, within April/June 2021 a decision might come to allocate a budget for this mission. However, the payload of this orbiter is not yet defined, so the PESC team asked how the MVA can support with identifying a payload that might interest the international science/moon community. The team also mentioned that Deep space exploration is one of the goal of the EgSA . The Egyptian team mentioned that the PESC project was a catalyst to ignite moon activities in Egypt.



Egypt PESC team has formed a subgroup to perform a literature research to gather more information about the payload for the 12 U CubeSat.

In addition to the above activities Egypt PESC team mentioned a plan for education in Egypt. The team will propose to improve a current educational program for university students and expand it to cover moon activities. This may involve sending students from Egypt to study graduate degrees in topics related to the moon.

The Egyptian team involves 20 students and young professionals from different background. They have formed a local MVA network already.

### Discussion Summary:

#### **Vice President:**

The vice president advised the team to think for the longer term and how the 12 U CubeSat moon mission can serve the long-term vision of Egypt. In other words, what projects that will come after launching the first orbiter. Egypt team explained that for the coming 25 years, they do not see Egypt will be capable to offer a significant contribution in moon activities. The vice president asked the team if they looked at Egyptian private companies, but the PESC team explained that the space agency is the core of Egypt space ecosystem, and if any private company will show interest, the agency will direct them.

#### **President:**

The president asked about the overall setup of the team. How was the team formed? Is the PESC a multiplier/catalyst? As mentioned above, the PESC project is a catalyst and the team was formed after the PESC call in summer 2020.

Egypt team mentioned that International partnerships is important to draft a vision for Egypt. Egypt would like to specialize on some parts of the mission hardware/software, but to find partners from the world to support with whole mission.

The president asked if Egypt could foster the creation of critical mass in Africa for the Moon? Egypt team think that they need a success story to base future partnerships at a regional level. The president also mentioned that the MVA can offer support to the Egyptian case project by organizing a webinar.

### Way forward:

It was suggested for Egypt team to to come up with more specific measured activities to measure the future progress. And, it was suggested that there are activities like the WGs in the MVA, they can join them and get exposed to many international moon activities, also recorded



presentations of the Moon Village architecture WG are available in the MVA website for more information. For the particular mission, it was suggested that the 12U CubeSat orbiter can accommodate a payload for other countries.

#### Bottom – Up

Many suggestions are indicate above. It was suggested to think about ideas how to foster involvement of non-space industry for the moon within Egypt. The MVA can host a webinar to show the Egyptian Moon orbiter program at a later date.

#### Top – Down

Egypt Space Agency already involved and showed interest for a moon mission.

Since Egypt is the seat of the African Space Agency, EgSA could foster the involvement of other countries in moon related activities.

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# Mexico Roadmap Feedback Meeting Report

8 January 2020

## Participants:

From the Mexico PESC Team:

- 1- Carlos Mariscal
- 2- Tania Robles
- 3- Genaro Grajeda

From the MVA, the President, vice President, and PESC project manager attended the meeting.

## Background

This report summarizes the discussion happened during the Feedback meeting with Mexico team. The MV-PESC project main deliverable is a roadmap for an emerging space country to participate in the Moon Village. As the participating teams drafted a roadmap, the goal of this meeting is to provide feedback with additional mentorship. The roadmap submitted by the team on October, was discussed and possible future activities were recommended.

## Mexico Roadmap presentation:

The History of space activities and general overview of Mexico's capabilities were presented first. Mexico PESC team is interested in the following three projects:

- 1- **Robots for multi – purpose activities:** Mexico PESC team are discussing with Mexican Space agency to turn the project into a national space project with the support from Airbus defense and ESA and other international partners.  
Support requested from the MVA is an official recognition for visibility, and support to link the project with the international moon community. This might also lead to find customers.
- 2- **Manufacturing in microgravity and lunar materials:** The idea is to Start with R&D activities first until the lunar robotic of the above project (robots) become a reality. Then, R&D activities can be implemented. Potential local stakeholders are commerce chamber and the space agency. First step is to convince the universities to conduct R&D. MVA support to facilitate the communication with international parties.



- 3- **Communications in the moon for human and robotic interaction:** First step is to create a workshop about the topic. MVA support for recognition.

## Discussion of the Roadmap:

### Vice President comments and questions:

- 1- Add a traceability matrix between the three projects in relation to the building blocks
- 2- There are Communication Protocols developed by NASA for the moon. John Mankins will share slides with Mexico team about this communication protocol.
- 3- Mexico PESC team raised the idea for a working group just for lunar communication. However, within the context MV Architecture WG, communication is a considered element. A subgroup within the MV Architecture WG can be also considered.
- 4- Suggestion for Tania: maybe to add 1/6 g parabolic flights to perform some R&D activities.
- 5- There is a potential for international cooperation between Mexico Team and some institutional members in the MVA, for example, Yuzhnoye SDO.

### President Comments and questions:

- 1- How the second project mentioned above (microgravity research) is relevant or related to Mexico? Genaro from Mexico Team answered that the project is based on skills available in Mexico.
- 2- Suggestion: Try to get some specific goals to measure future progress and make the follow – up process easier.
- 3- Carlos is involved in a robotic mission developed by the University of Mexico city to be launched by Astrobotic. So Mexico PESC team could decide to join forces and convert the above 3 projects into a national project. Soon they will approach the Space agency to sense the interest.
- 4- About Project 3 above: the president mentioned that there is no commercial frequency available for moon commercial missions, and governments should ask the ITU for a commercial frequency allocation. - The president will send the report of the technical panel that dealt with this issues in the frame of the Hague Space Resources Governance Working Group.
- 5- Outreach and education are important which is missing from the roadmap. There was an encouragement to add education and outreach to the roadmap.

## Way forward:

Specific objectives are required for the roadmap to be able to follow up and measure the future progress of Mexico Team. The vice president suggested to the team to watch the presentations



in the MVA website and recoded during the Moon village architecture Working group online workshop in December 2020.

#### Bottom – up:

The following actions have been suggested:

- 1- Contact the UN center in Mexico in order to identify complementary goals and create synergy
- 2- Set-up a national MVA network which will allow to create a permanent platform and increase the PECS team
- 3- Get involved in the relevant MVA WGs
- 4- Define an action plan to measure the future progress of the team within the coming 6 – 12 months

#### Top- Down

- 1- Contact The space agency –MVA can support a meeting with the space agency, if considered usefull
- 2- Share the invitation letter to join the GEGSLA with AEM



# Kenya Feedback Meeting Report

11 January 2021

## Participants:

From Kenya PESC team:

- 1- Andrew Nyawade
- 2- Changoma Warrakah
- 3- Arnold Bundotich
- 4- Nuria Ali
- 5- Ann Njeri

From the MVA, the president, vice president, PESC project manager and PESC regional coordinator participated

## Meeting Overview:

Kenya PESC team started the presentation with an emphasis on developing local capacity to establish a viable space program in 2030. Kenya is working with the MVA via different corporations. Among the current strength fields in Kenya is space weather research and GNSS activities. The team presented about the several projects mentioned in the roadmap. They will conduct feasibility studies about the mentioned projects. Therefore, they requested a professional support from the MVA and guidance for partnerships and cooperation with the international moon community.

## Discussion:

### **Vice President:**

Because one of the projects mentioned by the Kenya team was about generating power from nuclear sources, the vice president mentioned that the only viable nuclear technology for the moon is RTG. There are common similarities between earth and moon. But thermal management for RTGs is challenging because on earth water is used for thermal management. This means that a new thermal management technology should be used for RTGs in the moon.

About the Agriculture project the vice president suggested that the team consider the idea of researching about simulants for the lunar regolith. This simulated lunar regolith is important



because it can be used to simulate agricultural projects in earth. This research is new and not a lot of previous works were done on the field.

About the Astronomy project: The vice president suggested for the team to take advantage of the unique features of the moon like the permanently shadowed regions and the potential to use lunar materials to build astronomical instruments. Also, to take advantage of the radio quiet area.

Mining and exploration project: The vice president mentioned that the overall issue of sustainability is a important issue in the mining sector in earth. This has generated an interest to create an All-Electrical – Mining equipment. The vice president suggested to link between the mining industry interest for electrical equipment with mining in the moon.

#### **President:**

The president started the discussion with a question about the Connection between Kenya Space Agency and the Kenya PESC team. The team is well connected to the space agency, and they communicated that the space agency would like to use the PESC opportunity to grow, and the agency is fully supporting the participation in the PESC project.

The president noted that there are many topics and projects in Kenya Roadmap. He suggested that evaluating and prioritizing the projects might be a good start for Kenya especially that a long term objective for Kenya in the roadmap is still missing. The president suggested to create an application from Kenya to predict the weather on the moon and emphasized that the participation at moon village don't require complex and expensive developments like ISS.

### **Way forward**

#### **Bottom – up**

- 1- Measuring the achievement of the future progress.
- 2- Prioritize the activities proposed.
- 3- Initiate several outreach activities like webinars and participate in WGs.

#### **Top - Down**

Kenya Space Agency is involved with the MVA but PESC team was suggested to raise the point for the agency to participate in an expert group for sustainable lunar development.

It was also suggested for the PESC team to consider cooperation with other countries like Egypt. Egypt is planning for a 12 U satellite to the Moon.



# Nepal Feedback Meeting Report

11 January 2021

## Participants:

- 1- Anamol Mittal
- 2- Prabin Dhakal
- 3- Simran Dhoju
- 4- Rashbin Lamichhane
- 5- Ankit Khanal

From the MVA, the president, vice president and the PESC project manager participated.

## Roadmap Presentation:

Nepal PESC team started with a discussion about some space activities in Nepal. There is no space agency in Nepal, but the PESC team in Nepal initiated an organization called NESSA. NESSA organize the National Space meet by the group. Nepal has just sent their first CubeSat by Kibo Cube and there is a company building a CubeSat.

In Scenario Alpha the team is proposing analogue habitat due to the geography in Nepal which is similar to space environments. The idea is to train people for Mars as the vision of Elon Mask (1 million people in Mars). International Organization like Mars academy performed analogue missions in Nepal already. For this, they have collaborated with the Mars society and other organization and they are organizing webinars to inform general audience about analogue mars missions.

Due to high altitude locations in Nepal, Scenario Beta is to have an observatory. Section 1 is a feasibility study for the observatory (to see if there is a demand and a support from the government). Then to build a small observatory and then a large telescope.

Scenario Gamma: The establishment of space tourism sector in Nepal. The facility is in Nepal with space theme for tourists and to watch the sky in Nepal. This means that they want to link space with the tourism sector.

Nepal PESC team proposing to organize webinars (in February) as a next step. They are also planning to work on a research paper about the importance of analogue missions for Nepal. Reaching out for national and international organization for feasibility study for the analogue missions, observatory, and space inspired tourism destination.



MVA can provide a feedback about the vision. Acknowledging the work in the international level. To connect NESSA with international space community.

### Discussion:

#### **Vice President:**

The vice president commented that R&D is an important field that should be mentioned in Nepal Roadmap. For example, the Geography of the Hemalaya can be like the geography of some locations in the south pole of the moon. This will allow for testing of some technologies in the Hemalaya.

The vice president suggested for Nepal team to reach out for potential partners (MVA can support with institutional members). He also mentioned a connection from Alabama with interest in 3D printing.

#### **President:**

An important challenge that faces Nepal is that the country is not actively investing in space capacity building in general. The country lacks basic infrastructure, and the topic of space is not considered a priority for Nepal. The president suggested that space analogue facility can motivate STEM education in Nepal through the technical university.

### Way Forward:

- 1- PESC Nepal Team to be more specific on the action to measure the future progress (action plan).
- 2- More brainstorming to come up with ideas to be presented for the government.
- 3- Obtain credibility by partnerships between NESRA and MVA. This will help the Top – Down discussion.

### Bottom – up:

- 1- Actions to facilitate the roadmap by involving in MVA and let other people participate from Nepal.
- 2- Soon, the MVA will create a new working group about analogue habitats, and Nepal can participate.
- 3- Approach National Academy of Science – Nepal.

### Top – Down:

- 1- Participate on COPUOS.
- 2- Outreach campaign for CHANDRAAN-3.



# Chile Feedback Meeting Report

13 January 2021

## Participants:

- 1- Loreto Moraga
- 2- Juan Carlos
- 3- Pamela Munoz
- 4- Rogrigo Suaraze
- 5- Erin Flores
- 6- Mario Esquivel
- 7- Rodrigo Suarez

The president, vice president, board member and Latin America Regional Coordinator Mrs. Imanuella and the PESC Project Manager Mr. Ghanim Alotaibi also participated in the meeting.

## Roadmap Presentation:

The Chile PESC team explained that there is only council for space development and the team is trying to convince council members to create a space agency. Until the establishment of a national space agency in Chile, the PESC team would like to promote moon activities, and the team is well connected with the government.

The team explained about the strength points in Chile which can be summarized as follows: There are many analogue sites, Mining industry, Astronomy, Energy, Science, and some industries. These fields can be linked to the Moon Village Building Blocks as follows: Utilities, Resources, Habitation, and transportation and logistics, Operations. Human ops and health, Robotic Systems and sciences.

The team also explained that Scenarios Alpha is not valid for Chile, but there are some expected programs in the future.

The Projects presented are as follows:

- 1- Telescope on the Moon
- 2- Light Vehicles in the moon
- 3- Space Architecture which consists of 4 projects.
- 4- Technology in Vegetable Crops products in a high-altitude location.
- 5- Tunnels Designing and Underground Mining Facilities.
- 6- Clothes for the Moon by the production of fabrics.





## Discussion:

### **Vice President:**

The vice president explained that there are many points of intersection with the architecture WG. He suggested to investigate commonalities between mining and astronomy in extreme environments. Furthermore, the idea of agriculture in the moon is critical discussion in the WG, a key issue is the presence of nitrogen so if there is a viable scenario at high altitude, this will be relevant for the moon.

There is a lot of interest for analogue mission. But the vice president pointed out on how to make an analogue facility in Chile different than others.

There is an opportunity to improve the terrestrial mining operation by developing space zero carbon emission mining operation in the moon. Dr. Newman from MIT is an expert in space suites. The president can establish contact with her.

### **President:**

One advice is to prioritize and to make the objectives more measurable for future progress and see in 6 to 12 months what are the achievements. The mentioned projects overlap with many activities in the MVA, so Chile team can deploy people in some of the MVA WGs. Another recommendation was to identify a national MVA coordinator.

Outreach and education are extremely important, however were not mentioned in the presentation.

The architecture WG is re-evaluating the definition of the three scenarios in the roadmap. The new definitions might be more suitable with Chile current roadmap. It was advised that Chile PESC team review the new definitions of the scenarios when published before they modify the roadmap.

### **Bottom – Up:**

The mentioned projects by the Chile PESC team intersect with the topics in the WGs. Therefore, the participation of the Chile team in the WGs will be beneficial. Outreach activities in Chile about the moon is also an important element.

### **Top- Down:**

The government in Chile received an invitation to participate in GEGSLA. It is a opportunity to PESC team to contact the government on this issue. Also, space is a tool for international cooperation, in which Chile can take part.



# Jordan Feedback Meeting Report

13 January 2021

## Participants:

From Jordan PESC team:

- 1- Sahba Alshawa
- 2- Jude Alsade
- 3- Merna Zrekat
- 4- Ghaidaa Sunna

The president, vice president, PESC Regional coordinator and PESC project manager also participated in the meeting.

## Roadmap presentation:

Jordan PESC team started the discussion proposing to build an analogue facility in Wadi Rume in Jordan. All scenarios are considered. They want to identify specific science goals for the facility. For this reason, they will target universities and educational institutes in Jordan. They assume that all funding will come from scenario gamma. The PESC team revealed that they have identified a potential investor, but they must think on how the facility can generate revenues. Therefore, the team would like to estimate a budget within several months and create a project plan by October 2021. By the end of the year they will be able to perform some outreach activities like video shooting. The start of building is 2025, but testing should start before that. Calls were conducted with experts in analogue facilities and they are trying to draft a vision for the facility.

The utilization of the facility should include Engaging the community including the traditional and urban community. The team will also start an outreach campaign that includes a logo design, social media pages and the participation in World Space Week.

The team also proposed an idea about arranging competitions for space suite design as proof of concept by October 2021.

The UN center of central and west Asia is in Jordan and the team want to engage it. The team also planning to contact the Crown Prince Foundation



## Discussion:

### **Vice President:**

The vice president started the discussion with several questions as follow: Do you invest in the creation of this test as national, regional or international project? What is the basis for your commercial engagement? Is it tourism or doing space system? STEM? Actual technology development? The answer by the Jordan PESC team about the previous questions is that they would like to research about water management and have the facility for commercial use. An investor has some interest in education for the Arab youth and producing educational materials, they are thinking to rent out the facility to him to conduct space camps.

The vice president informed the team that there is a discussion about building the first settlement in the Architecture WG, and there might be some areas of commonality between Jordan history and humanity future.

### **President:**

The president first suggested to utilize the CubeSat project that was built by some groups in Jordan. He also suggested to consider other approaches other than a business approach. Finally, the president emphasized on the creation of a local MVA network in Jordan because the MVA can offer a platform for the PESC team. This also includes social media.

## Way forward:

- 1- To view the MV Architecture working group videos in the website.
- 2- Consider working with the WG with relation to Jordan PESC team plans.
- 3- The MVA can support the Jordan PESC team by providing contacts of prominent women in the space field if the team wants to focus on women.

## Bottom – up

MVA is willing to retweet activities from Jordan and support in social media platforms.

## Top - Down

The government of Jordan might be interested about the UN activities, and the Jordan PESC team might find a link between moon activities capacity building, Jordan and PESC Jordan projects.



# Mongolia Feedback meeting Report

16 January 2021

## Participants:

From Mongolia PESC team:

- 1- Turtogtokh Tumenjargal
- 2- Erdenebaatar Dashdondog
- 3- Begzsuren Tumendemberel
- 4- Tuguldur Ulambayar

The president, vice president and the PESC project manager also participated.

## Roadmap presentation overview:

Mongolia PESC team started with a presentation about the history of space activities in Mongolia. They clarified that there is a national space council in addition to some private companies and NGOs and universities activities in Mongolia. Currently there is no space agency in Mongolia, but Mongolia ratified main space treaties.

Vision 2050 include some space activities and Mongolia will support space startups. The team justified the focus on Moon analogy because testing is essential for future missions to the moon.

The team described the value proposition of the Moon Analogy project, which include international competition and testing equipment. However, they need experience and data before they start building. In addition, there is a need for companies and other institutes for sponsorship, and MOSTA can do the management. More detailed description about the international competitions was also presented.

As practical steps, the team think that they should start with drafting rules and guidelines for international competition, perform a survey to allow potential stakeholders to share the ideas (few Asian countries are interested).

## Discussion:

### **Vice President:**

The vice president informed Mongolia PESC team that a number of different PESC countries proposed analog habitats. He advised them that they need to think about the key advantage



that Mongolia analog facility will have over the others. Therefore, the vice president proposed two ideas. First, there are strong lunar programs in US, China, Japan and India, if Mongolia team can find a way to bring one of the strong players as a co-sponsor, that will support the value proposition presented. Second, there is a lot of interest in the south pole of the moon and Mongolia has a competitive advantage as there are a lot of dry land area. The advice was to specify some locations in Mongolia that resemble places at the moon, so that activities there will be like activities in the south pole of the moon.

It will be a long time to get to the moon. A suggestion is to clearly identify connections between moon village projects and STEM (academic programs) to integrate it with education, which will attract more stakeholders.

**President:**

The president expressed that It is positive that Mongolia has a history with space exploration already. He advised to integrate education and outreach with Moon Analogy project as well as to create a MVA network in Mongolia as a permanent platform. A MVA network will support the PESC team to create social media accounts in Mongolian language. The president suggested to expand the experience of Mongolia in LEO to the moon and utilize the touristic aspect in Mongolia. An important aspect in Mongolia is the nomadic history, how this aspect can be integrated in moon missions?

There is an agreement with ISRO for outreach program with the MVA. The president suggested to bring this aspect if they like to increase visibility of Mongolia by partnering between Mongolia government and ISRO.

**Way forward:**

**Bottom – up**

To continue the activities Mongolia PESC team has already initiated.

**Top – Down:**

Mongolia government has received an invitation about GEGSLA, and PESC team might help the government to understand the aspects of the invitation.



# Kuwait Feedback Meeting Report

20 January 2021

## Participants:

From Kuwait PESC team:

- 1- Ghanim Alotaibi (MVA PESC project manager)
- 2- Abdulaziz Alareedh
- 3- Rawan Alshameri

The president, vice president of the MVA and the Middle East regional coordinator of the PESC project also participated in the meeting.

## Roadmap presentation:

Kuwait PESC team started to explain the major challenges facing Kuwait and how the involvement in the moon village concept can provide key solutions for the challenges. They have identified emerging markets that can be suitable for Kuwait to invest and specified preliminary list of sectors and skills that can be utilized for future moon activities. The team members also described individual projects.

As future steps the team will create a survey about equipment and labs that can be utilized for moon activities. This will start with a white paper to be drafted by April 2021. They will also organize a webinar about cultural consideration and continue working on individual research projects.

## Discussion:

### **Vice President:**

The vice president mentioned that in addition to the markets presented by the PESC team, they can add data processing as a new emerging market where it is possible mine cryptocurrency in the moon and send it to earth.

Regarding the cultural consideration webinar planned by the PESC team, the vice president suggested to use Lunar topology data from previous missions as artwork. He also suggested to integrate other PESC teams' projects in Kuwait roadmap. Finally, the president suggested to look at parabolic flights as a simulation for lunar gravity for the medical individual project.

### **President:**



Kuwait has no space agency and not a member in COPUOS. However, the present suggested to modify the wordings in the roadmap from “formulation of a space policy” to “provide an input for a space policy”. The president also suggested to find new members and expand the team further.

#### Way Forward:

- 1- To Be More specific for measured future progress.
- 2- To consider the support of MVA on webinars and WGs.
- 3- Identify connections between individual projects and country’s interest.